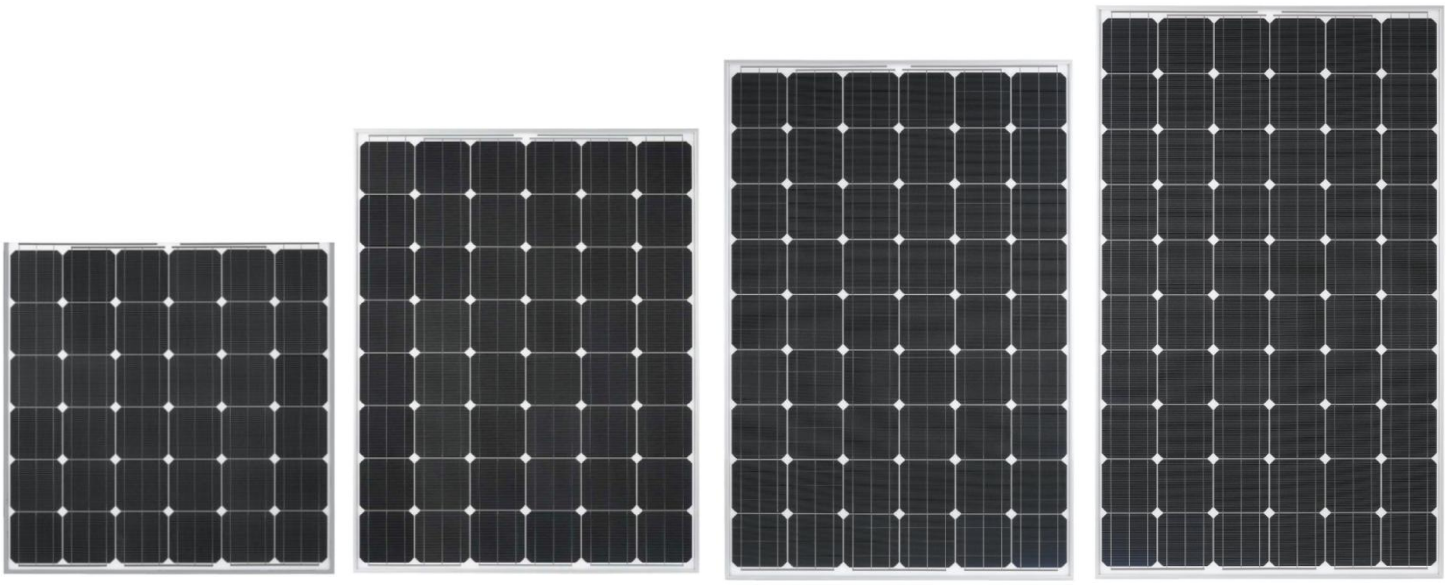
新日光能源科技
NEO SOLAR POWER

INSTALLATION MANUAL

- **D6M_BxA Series :** D6M_B1A / D6M_B2A / D6M_B3A / D6M_B5A
- **D6M_AxA Series :** D6M_A1A / D6M_A2A / D6M_A3A / D6M_A5A
- **D6P_BxA Series :** D6P_B1A / D6P_B2A / D6P_B3A / D6P_B5A
- **D6P_AxA Series :** D6P_A1A / D6P_A2A / D6P_A3A / D6P_A5A



This manual is for NSP photovoltaic modules listed above

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Please read this manual carefully before installing the modules. Non-compliance with these instructions may void the modules warranty.

General Information

This manual contains information regarding the installation and safe handling of NSP photovoltaic (PV) modules. All instructions should be read and understood before attempting to install. If there are any questions, please contact your dealer or NSP for further information. The installer should conform to all safety precautions in the manual when installing modules. Before installing a PV system, the installer should become familiar with mechanical and electrical requirement for the PV system. All installations must be performed in compliance with all applicable regional and local codes or other national and international electrical standards. Keep this manual in a safe place for future reference.

Safety Precaution for Installing Solar PV System

- NSP modules are qualified for Application Class A: Hazardous voltage (greater than 50 V DC) or hazardous power applications (greater than 240 W), where general contact access is anticipated. Modules qualified for safety under IEC 61730-1, IEC 61730-2 and within this application class are considered to meet the requirements for Safety Class II.
- Installing PV systems should be performed only by qualified or licensed experts.
- Ensure that the NSP modules are fastened to proper mounting systems designed for appropriate mechanical loads resulting from wind and snow, and the proper weight of the modules.
- It is suggested that completely cover the module with an opaque material during installation to keep electricity from being generated.
- Be very careful when disconnecting wires connected to PV modules that are exposed to sunlight, an electric arc may result. Such arcs may cause burns, may start fires and may create problems.
- Artificially concentrated sunlight shall not be directed on the module or panel.
- Use only insulated tools that are approved for working on electrical installations.
- Routine maintenance of module shall not involve breaking or disturbing the bonding path.
- All of installation and handling activities must be carried out with due care, all collisions must be avoided.
- Lift pallets by a fork lifter by a minimum of 70% of pallet length when loading and unloading from the length side of a pallet; and 100% of pallet width when loading and unloading from the width side of a pallet.
- Do not attempt to disassemble the module or remove any part of module.
- Do not remove the attached nameplate or components.
- Do not stand or walk on modules.
  • It is recommended to reserve a service walkway when designing the solar PV system.

- Do not place heavy objects on modules.
- Do not drop sharp objects on modules.
- Do not lift or transport modules by grasping the junction box or electrical leads.
- Do not drop the module down hard on any surface.
- Do not perform any work if the cables, connectors or junction box are wet due to the risk of electrical shock.
- Do not work in rain, snow or windy conditions.
- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of Isc and Voc marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacities, fuse sizes, and size of controls connected to the PV output. Refer to Section 690-8 of the National Electrical Code of an additional multiplying factor of 125 percent (80 percent de-rating) which may be applicable.

Fire Safety

- NSP modules are rated as Fire Class C according to UL 790 Standard.
- To use components such as earth ground fault circuit breakers, fuses and circuit breakers as required by local authority in the PV system for fire prevention.
- The fire safety of building may be affected by the roof construction and installations. Improper installation may cause hazards in the event of fire.
- Consult with local authority for guidelines and requirements for building or structural fire safety.
- For roof installation, PV modules should be mounted over a fire resistant roof covering which is rated for the application.
- Since sparks may be produced, do not install modules near equipment or locations where flammable gases can be generated or collected.
- In case of fire, NSP modules on the roof are likely to produce dangerous DC voltage and may have potential hazard, even in the case of:
  • Low light intensity
  • Modules being disconnected from the inverter
  • Modules being partly or entirely destroyed
- When fire has been extinguished or for the duration of fire, stays away from all elements of the PV system. Have your installer perform the necessary steps to bring the PV system back into a safe condition.

Mechanical Installation

- The design and installation of photovoltaic systems shall be in accordance with the National Electrical Code (NEC) and the Canadian Electrical Code (CEC).
- To install the modules in proper direction such as facing south in northern latitudes and north in southern latitudes for best power output.
- Please note that any shadows cast by the modules do not fall on other modules behind them. This can have adverse effects on overall system performance or may result in permanent damage to modules.
- Do not modify the PV module frames mechanically or chemically. It will void the warranty.
- Clearance between the module frame and mounting surface may be required to allow the cool ambient air circulating behind the module. It is necessary for optimum module performance.
- All fasteners (nuts, bolts, washers, screws, etc.) must be stainless steel made unless otherwise specified (it should use corrosion-proof fixing material).
- The module mounting structure must be made of durable, corrosion-resistant and UV-resistant material.
- There are two approved methods to mount NSP modules to the supporting structure. For all mounting methods, a minimum gap between the modules of 5 mm is required to allow for thermal expansion.

Method (1) : Attachment Using Screw

- Each long side frame has 4 mounting slots with dimension of 9 x 14 mm used to secure the module to supporting structure, as shown in Fig. 1.1.
- For normal installation, modules must be securely attached to the mounting structure using at least symmetrical mounting holes as shown in Figure 1.2 for normal installation. If additional wind or snow loads are anticipated for this installation (≤ 5400 Pa), additional mounting holes are also used as shown in Fig. 1.3.
- The module frame must be attached to a supporting structure using M8 stainless steel hardware together with spring washers and flat washers (all fitting components must be corrosion-proof material) as shown in Fig. 1.4.
- The applied torque is about 8 N-m.
- Here the standoff method or the rack method is recommended. The recommended stand-off height is 140 mm as shown in Fig. 1.5.

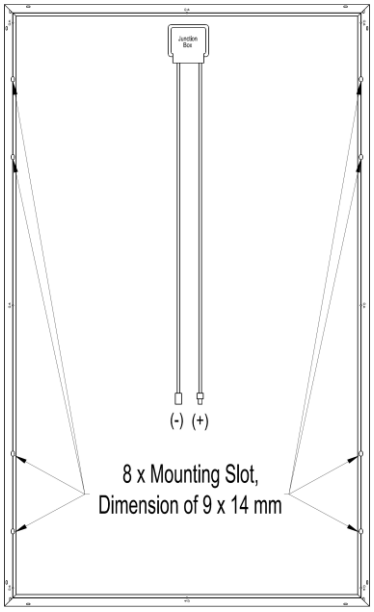


Fig 1.1

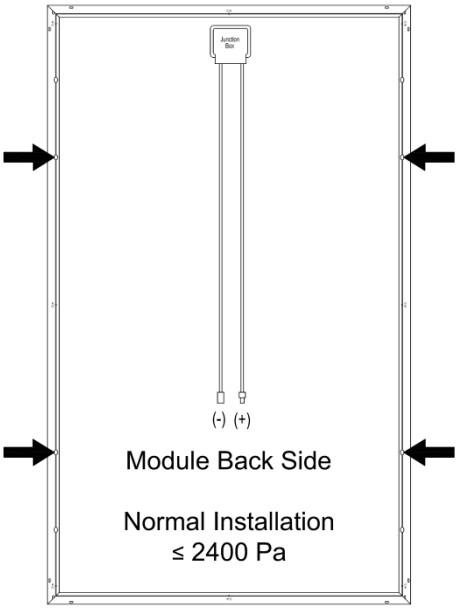


Fig 1.2

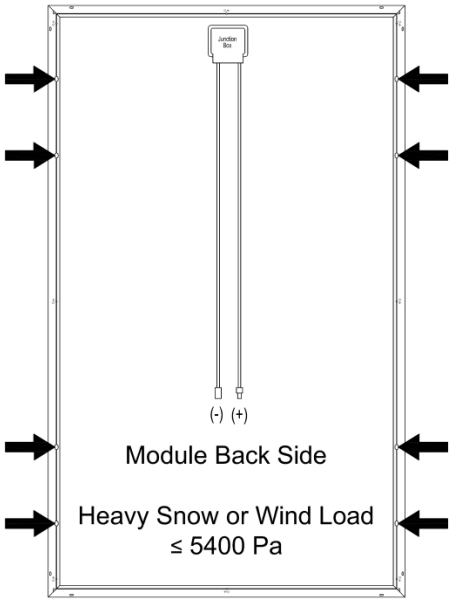


Fig 1.3

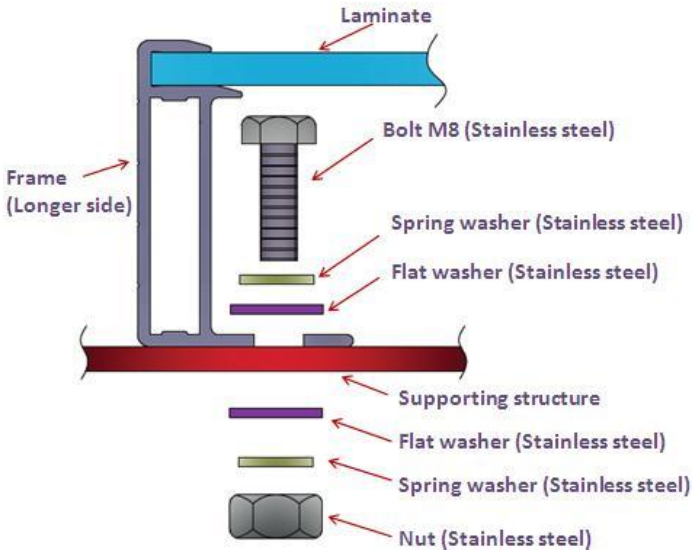


Fig 1.4

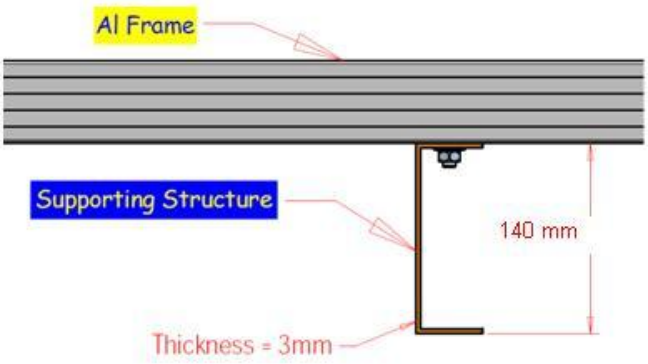


Fig 1.5

Method (2) : Attachment Using Clamp

- The modules may be mounted using clamps (Clamp A and Clamp B) designed for solar modules as shown in Fig. 2.1.
- Modules must be mounted at 4 symmetrical quarter points by the means showed in Fig. 2.2 & Fig. 2.3.

- The clamp position could be in a range as shown in Fig. 2.4.
- The clamps must be attached to a supporting structure using M8 stainless steel hardware (all fitting components must be corrosion-proof material).
- The applied torque is about 8 N-m.
- The modules are supported parallel to surface of the building wall or roof. Sufficient clearance (recommended is 140 mm) between the module frame and mounting surface of the wall or roof is required to prevent wiring damage and allow cool air to circulate behind the module.

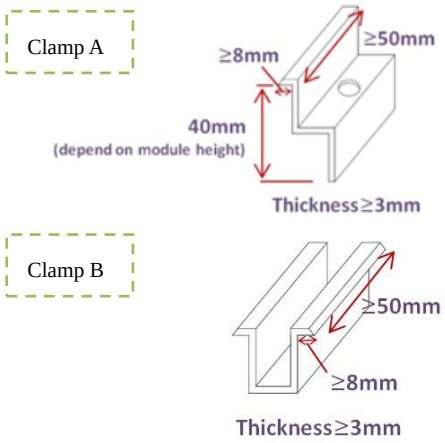


Fig 2.1

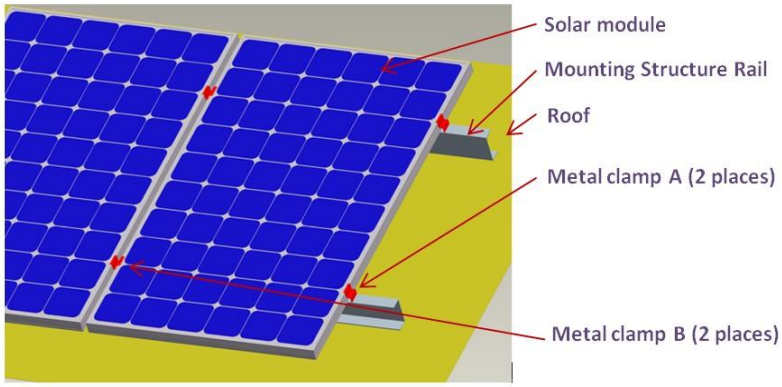


Fig 2.2

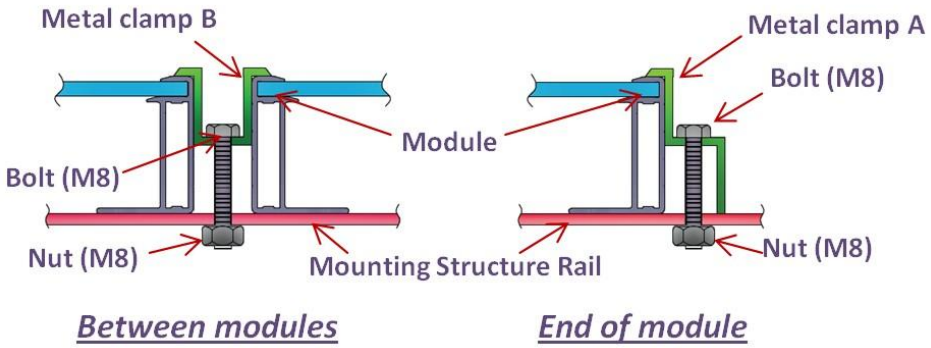
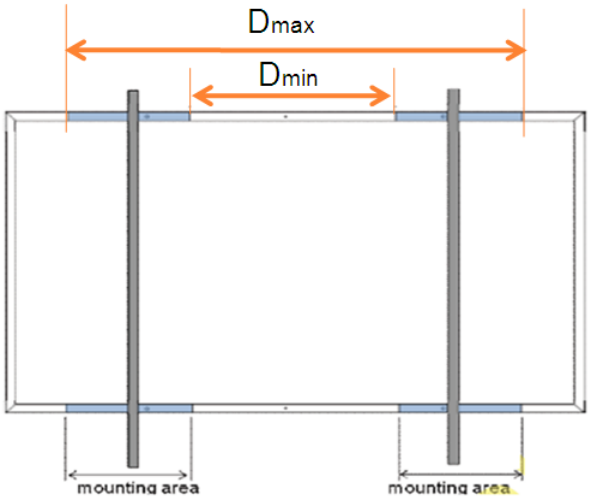


Fig 2.3



Model			D_{min}	D_{max}	Mounting Area
D6P_A1A	D6P_B1A	D6M_B1A	340	940	300
D6P_A2A	D6P_B2A	D6M_B2A	440	1040	300
D6P_A3A	D6P_B3A	D6M_B3A	640	1240	300
D6P_A5A	D6P_B5A	D6M_B5A	540	1140	300

Unit : mm

Fig 2.4

Electrical Installation

Grounding

- All module frames and mounting racks must be properly electrically grounded in accordance with respective national electrical code and local authority.
- A bolt, screw, or other parts used for bonding purposes within a module or panel shall not be intended for securing the complete device to the supporting surface or frame.
- Electrically ground the frame of the module or array to avoid the hazards of electric shock and fire.
- Bonding shall be by a positive means, such as clamping, riveting, bolted or screwed connectors, welding, soldering or brazing. If the bonding means depends upon screw threads, two or more screws, or two full threads of a single screw must engage the metal.
- The array frame shall be grounded in accordance with NEC requirements for grounding solar electrical system.
- The module frame must be properly electrically grounded.
- The grounding wire must be properly fastened to the module frame to assure good electrical contacts.
- Each long side frame has 3 grounding holes with 4 mm diameter and marked with a symbol “G” or “⏚” adjacent to their location for ground contact. In addition, there is a grounding hole at each short side frame in order to increase operation friendly. The location of grounding holes are shown on Fig. 3.1.

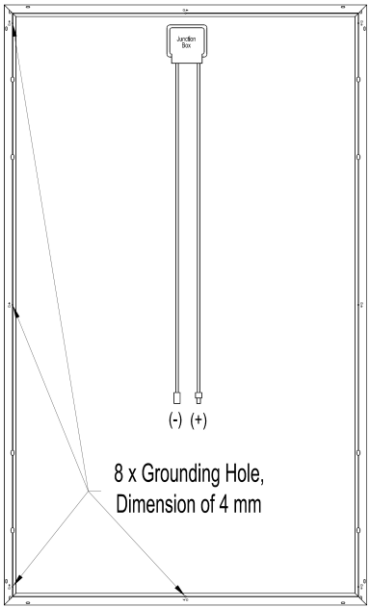


Fig 3.1

- Grounding wires must be connected to the module frame at one of these locations.
- Great care should be exercised to ensure that corrosion caused by the grounding means is avoided.
- Corrosion can increase the resistance of the grounding connection on the module, or can even cause the grounding connection to fail entirely.
- Corrosion can be caused by the effects of weather, humidity, dirt and so on. Corrosion can also be caused when two dissimilar metals contact each other (galvanic action).
- All grounding hardware (nuts, bolts, washers, screws, etc.) must be stainless steel unless otherwise specified (it should use corrosion-proof fixing material), as shown in Fig. 3.2.
- The grounding wire should not be smaller than 12 AWG.
- The grounding wire should be 2 meters in length, multi conductor and rated of 105°C and 600V.
- Recommended torque value is 2.3 N-m (20.4 lb-in).
- There are two approved methods to ground NSP modules.

Method (1) Grounding Using Bolt and Nut

- To the grounding hole, secure the grounding wire with stainless steel hardware consisting of bolt, spring washer, flat washer, cup washer, star washer and nut as shown in Fig. 3.2.
- Length of bolts should not be more than 25 mm in order to avoid contacting the back sheet of module.
- The use of cup washer, also called terminal cup washers, is to prevent the grounding wire slipping out from under the screw head (and/or the flat washer).

- To make sure the cup washer is placed between the wire and module frame.
- Choose an adequate size for the cup washer and flat washer so the wire is fully clamped between them.
- The star washers must be used to make the electrical connection between grounding hardware and module frame by scraping off the anodized film of Al frame.

Method (2) Grounding Using Grounding Lug

- To select a grounding lug listed for direct burial and outdoor use (tin-plated, solid copper lay-in lug with a stainless-steel set screw) capable of accepting a 4-12 AWG copper conductor, e.g. ILSCO GBL-4DBT, Burndy CL50-1TN.
- Length of bolts should not be more than 20mm in order to avoid contacting the back sheet of the module.
- The star washers must be used to make the electrical connection between grounding hardware and module frame by scraping off the anodized film of Al frame.
- To the grounding hole, secure the lug with stainless steel hardware consisting of bolt, flat washer, star washer and nut as shown in Fig. 3.3.

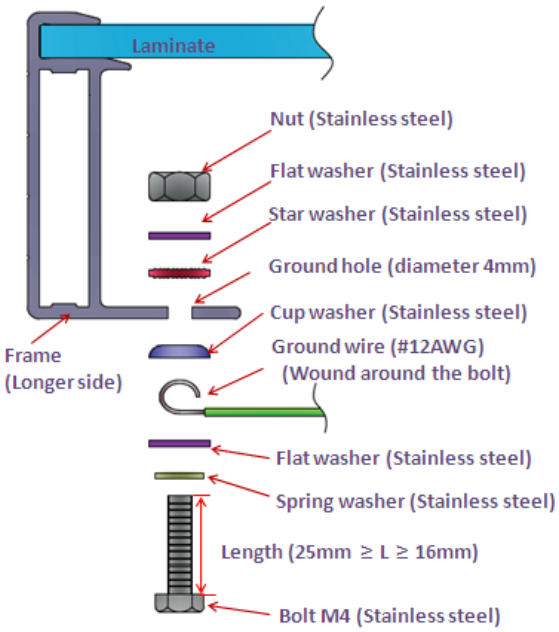


Fig 3.2

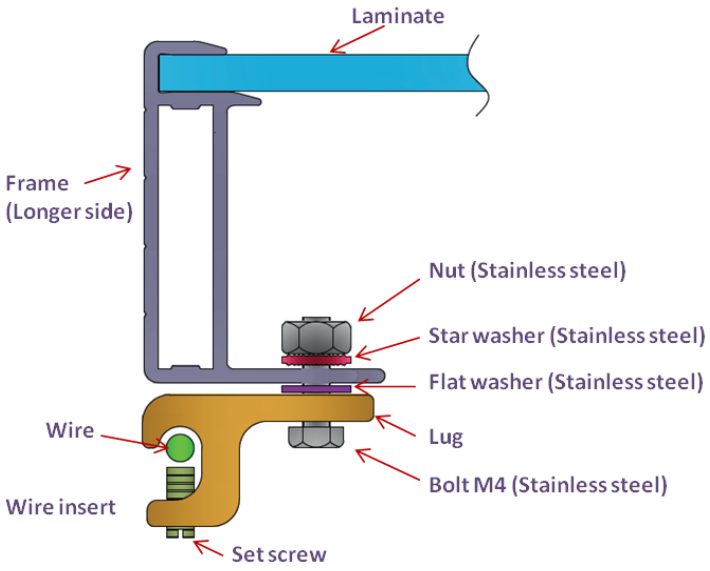


Fig 3.3

Series and Parallel Wiring

- Modules can be wired in series to increase voltage. Connect wires from the positive terminal of one module to the negative terminal of the next module. Illustration A as below shows 4 modules connected in series.
- If modules are connected in series, the total voltage is equal to the sum of the individual module voltage.
- The maximum open-circuit voltage of the system must not be greater than the specified maximum system voltage of the module.

Caution : Do not connect modules with wire terminations in series to increase voltage.

- To connect modules in parallel to increase current. Connect wires from the positive terminal of one module to the positive terminal on the next module. Illustration B as below shows 4 modules connected in parallel.
- If modules are connected in parallel, the total current is equal to the sum of individual module current.
- Connecting modules in parallel, the wiring and connectors can become overheated at high current. Use system wiring with suitable cross-section and connectors that are approved for use at the maximum short-circuit current of the module. The recommended cable is PV wire with a cross section of at least 4 mm^2.
- Maximum number of series connected modules: ≤ (Maximum system voltage)/(Voc of the module at STC)
- If fuse is used, number of parallel connected modules: ≤ (Maximum fuse rating)/(Isc of the module at STC)

■ *Note* ■

It is recommended that paralleling modules be performed using an external junction box. However, a small number of modules may be paralleled using the junction box on the back of the modules. Contact your local seller for more information.

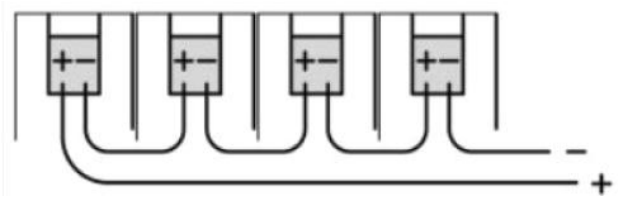


Illustration A：Series for more voltage.

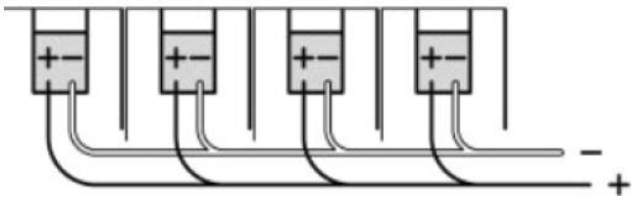


Illustration B：Parallel for more current.

Module Wiring

- Each module has two 12 AWG standard 90°C sunlight resistant output cables each terminated with plug & play connectors.
- The cable is suitable for applications where wiring is exposed to the sunlight directly. We recommend that all wiring and electrical connections comply with the National Electrical Code (NEC).
- For field connections, use the solar cable with appropriate cross section according to TUV 2 PfG 1169 or use the minimum 12 AWG copper wires insulated for a minimum of 90°C and sunlight resistant as well.
- According to IEC 60189, the insulation material used for internal wiring should have a temperature rating of minimum 90°C.
- Wire Type: PV module interconnections should be 90°C wet-rated conductors. An allowable wire type is using USE-2 single conductor cable and PV wire for exposed applications.

Commissioning & Maintenance

All work in commissioning and maintenance of a system must be performed by a qualified PV technician.

Bypass Diode

- Modules have bypass diodes integrated in the junction box and are wired in parallel with series string. In the unlikely event of diode failure, it is recommended to contact with NSP or local agent for checking / replacing bypass diodes.
- Be cautious of electricity shocks while commissioning and maintaining the solar power system.

Testing

- Test all electrical and electronic components of the system before commissioning.

Maintenance

- Clean the module glass when it’s dirty, use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove sticky dirt.
- Check the electrical and mechanical connections regulatory to verify they are clean, secure and undamaged.

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- The use of this manual, the installation conditions or methods, operation, use and maintenance of PV modules are beyond NSP's control, NSP does not accept responsibility and expressly disclaims liability for loss, damage or expense arising out of or in any way connected with such installation, operation, use or maintenance.
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